



MOXI Flow™

USER GUIDE



For Research Use Only. Moxi Flow is not for use in diagnostic procedures.

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Introduction

The ORFLO Moxi Flow™ is a portable, micro-flow cytometer that utilizes a disposable, thin-film cassette and a combination of a 532nm laser, precision optics, analog and digital hardware, and proprietary software to perform automated particle counting and analysis functions.. It combines the gold standard Coulter Principle with micro-flow cytometry to deliver highly accurate and repeatable results in less than 10 seconds per test.

The Moxi Flow™ performs very accurate cell counts and quantitative assessments of cell health, apoptosis, and cell cycle. The system is portable making it ideal for use in a hood or multiple lab locations. Test results are displayed in the form of histograms and scatter plots. The Moxi Flow™ can store up to 2GB of data and, if desired, the data may be downloaded to a PC or Mac via USB connectivity via a Bluetooth wireless connection.

The system is intended for research use only and has been tested with cell types that are representative of those commonly used. It is not intended for use in medical diagnostic procedures.

About the User Guide

The *Moxi Flow™ User Guide* provides detailed information for operating, maintaining, and troubleshooting the Moxi Flow™ system.

The user guide does not include instructions for using the optional Moxi Flow Analysis Software. For more information on this product, please visit www.orflo.com.

Similarly, the user guide does not include information on preparing samples prior to running them in the Moxi Flow™. For more information on this topic, please visit www.orflo.com.

Conventions Used in the User Guide



WARNING

Alerts you to a situation that may cause injury to the user.



CAUTION

Alerts you to a situation that may cause damage to the system, loss of data, or incorrect results.

NOTE

Indicates additional related information that may be helpful to the user.

Safety Precautions

The Moxi Flow™ has integrated safety features that are designed for the protection of the user. Use the Moxi Flow™ only as directed in this guide. Please review and understand the safety instructions below before operating the system.

General Safety



WARNING To avoid the danger of electric shock:

- Prior to use, verify that the USB cable and USB charging adapter are plugged securely into a properly grounded AC power outlet. Verify that the connection between the USB cable and the instrument is secure and the AC power in your location is within the specifications for the instrument (see page 17).
- Do not immerse the instrument, USB cable, or USB power adapter in liquid or allow liquid to enter the instrument.
- Do not attempt to disassemble or service the Moxi Flow™. The instrument has no user serviceable parts. All service must be performed by ORFLO Technologies.



WARNING To avoid the danger of fire or explosion, do not use the Moxi Flow™ with flammable or explosive liquids.

Laser Safety



WARNING The Moxi Flow™ is a Class I laser product. The system contains a Class IIIb laser that operates at 532 nm. Direct exposure to laser radiation is harmful. The following guidelines should be followed to avoid exposure:

- An interlock on the upper door prevents the laser from operating when the door is open. Do not attempt to defeat the interlock and run a test with the door open.
- Do not operate the Moxi Flow™ if there is any damage to the instrument's enclosure.

Biological Safety



WARNING Biological samples have the potential to transmit harmful or fatal disease. The following guidelines should be followed to minimize the risk of exposure to biohazardous materials.

- Handle all biological samples as if they are capable of transmitting harmful infections.
- Wear appropriate personal protective equipment (PPE) including clothing, eyewear, and gloves.
- Do not pipette by mouth.
- Dispose of biological waste in accordance with all applicable local, state, and federal regulations.

Moxi Flow™ System Overview

The Moxi Flow™ Kit includes the Moxi Flow™ instrument, USB Cable, Power Adapter (US and EU versions only), USB Flash Drive with User Guide and one pack of 25 Cassettes.



Component

Function

Touch Screen Display	Allows user to interface with the instrument by pressing on icons and targets. Displays all information needed for operation and analysis of results.
Power/Reset Button	Turns instrument on and off. Resets the unit when pressed and held for >5 seconds.
Lower Door	Manually opened and closed by user to allow insertion of a test cassette.
Upper Door	Manually opened and closed by user to allow loading of a test sample. Door must be closed prior to running a test.
USB Cable Port	Connects instrument to USB cable.
Cassette	Disposable used for loading samples. Each cassette contains two fill ports thereby allowing for two tests to be run per cassette.

Moxi Flow™ Accessories



Power Adapter (US style)



Power Adapter (EU style)



USB Cable



USB Flash Drive with User Manual

<u>Part</u>	<u>Function</u>
USB Cable	Connects instrument to PC/Mac or power adapter
Power Adapter, US Style (US kit only)	Connects USB cable to a 110 VAC outlet
Power Adaptor, EU Style (EU kit only)	Connects USB cable to a 220 VAC outlet
USB Flash Drive	Contains Moxi Flow™ User Guide

Getting Started

The Moxi Flow™ is shipped in a condition ready for initial use. To begin, plug the USB Cable into the instrument at one end (mini-USB). Plug the opposite end of the USB Cable (standard USB) into the Power Adapter. Plug the Power Adapter into an AC outlet that matches the rating of the Power Adapter.



CAUTION

Use only an Orflo supplied USB Cable and Power Adapter. Use of other products may result in inaccurate test results or damage to the instrument.

NOTE

Tests should only be performed with the instrument powered by an AC source. Although the instrument has an internal, rechargeable battery, Orflo strongly recommends that tests not be run on battery power alone.

General Guidelines

The Moxi Flow™ system is used with Moxi Type MFM and Type MFS Cassettes. Refer to the Specifications section for information on the operating ranges for the system.

The sample volume for a test should be 50 µL.

If necessary, prepare dilutions of the sample using ORFLO Diluent (Cat. No. MXA006) or a diluent that is compatible with the characteristics of the cells or beads. The diluent used should not cause changes in the cell size and should have sufficient conductivity to enable operation of the instrument. Water, hypotonic, or hypertonic solutions are **not** acceptable diluents.

Materials Required

Cell or bead sample (diluted and dissociated, if necessary); 50 µL minimum.

Pipette and appropriately sized pipette tips

Using the Moxi Flow™

Settings

Press the Power Button to turn on the instrument. Set the date and time by pressing the **Settings** icon on the main menu of the Moxi Flow™. Then use the arrow keys and follow the instructions displayed on the screen.



Running a Test

1. If necessary, dilute a cell or bead suspension with ORFLO Diluent or an appropriate diluent so that the cell concentration is within the operating range of the cassette being used (Type MF-M: 1×10^4 to 1.75×10^6 cells/mL, Type MF-S: 1×10^4 to 2×10^6 beads/mL).

For Type MF-M cassettes, a dilution of 1:5 to 1:20 is recommended for most mammalian cell lines, but the appropriate dilution will depend on cell type and seeding density. Type MF-S cassettes will typically require no to 1:2 dilution depending on cell type and seeding density. The volume required for an accurate count is approximately 50 µL.

2. Turn the instrument on by pressing the power button and the **Home** screen will be displayed. Select a test type by pressing one of the icons displayed on the screen.

NOTE: The instrument must be plugged in to an AC source to run a test. Tests should not be run on battery power alone.



3. Open the Upper and Lower Doors. Insert a test cassette and close both Doors. The Moxi Flow™ will automatically perform a calibration step and then prompt the user to load a sample when complete.



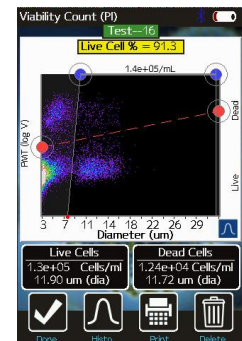
4. Open the Upper Door and pipette a 50 µL sample into the fill port of the cassette (either test 1 or test 2, depending on which end of the cassette was inserted into the instrument) and close the Upper Door.



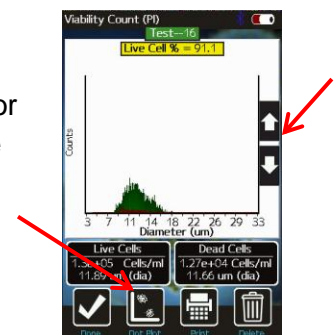
5. The Moxi Flow™ will begin the test and the results will be complete in approximately 8 seconds. The results will then automatically be displayed on the screen.

Managing the Data

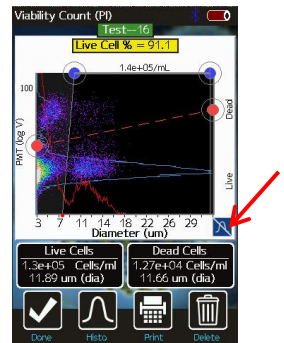
1. The results of a test are initially displayed as a scatter plot. The results of a Viability Count (PI) test are shown as an example. Live cell and dead cell counts are displayed below the graph. Live cell % is reported in the yellow box above the graph. The gating can be manually adjusted by pressing the blue or red dots and dragging them to the desired position. Live and dead cell counts will update automatically.



2. Press the **Histo** icon to view the results in the form of a histogram. Press the up and down arrows to the right of the graph to increase or decrease the vertical scale. Press the **Dot Plot** icon to return to the scatter plot.

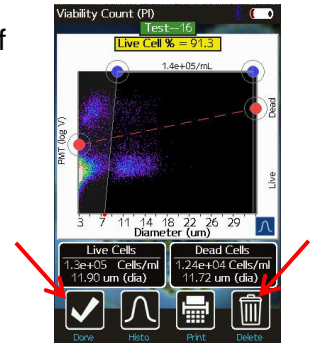


3. Press the blue square icon at the lower right corner of the graph to overlay histogram curves on the scatter plot. Press the blue square icon again to remove the overlay curves.



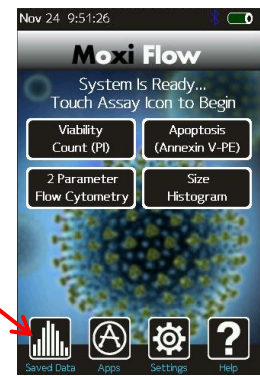
4. Press the **Delete** icon at any time to permanently delete the results of the test.

5. Press the **Done** icon to save the results and return to the **Home** screen.

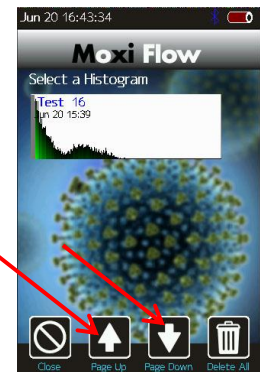


Retrieving and Deleting Data

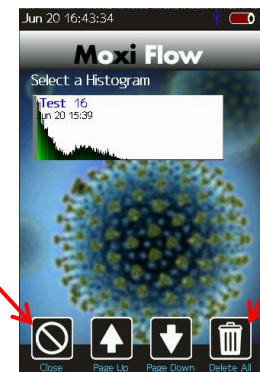
1. To open a saved test, press the **Saved Data** icon on the **Home** screen.



2. Icons for up to nine saved tests will be displayed on the screen. Press the appropriate icon for the test of interest or press the **Page Up** or **Page Down** icon to view more test results. Press the **Done** icon to close the test results and return to the saved results screen.

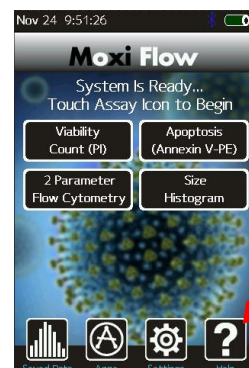


3. Press the **Delete All** icon to permanently delete the results of all saved tests.
4. Press the **Close** icon to return to the **Home** screen.



Moxi Flow™ Help

1. For help with operation of the Moxi Flow™, press the **Help** icon on the **Home** screen. Visual instructions for inserting a cassette will be presented.



2. Press the **Next** icon to view the next visual instruction that demonstrates how to pipette a sample into the cassette.
3. Press the **Next** icon to proceed to the next instruction screen or press the **Previous** icon to return to the previous screen.
4. Press the **Done** icon to exit the help screens and return to the **Home** screen.

For additional help, see the **Troubleshooting** table (page 12).

Connecting to Moxi Flow™ via USB

1. Unplug the USB Cable from the Moxi Flow™ Power Adaptor.
2. Plug the wide end of the USB Cable into your computer's USB port.
3. Plug the small end of the cable into the back of the Moxi Flow™.
4. Make sure the Moxi Flow™ is powered on and wait for it to appear as a disk (or flash) drive in your computer's file system (Windows Explorer for PC's or Finder for Mac).
Note: Upon power-up, the Moxi Flow™ will display a notification on the home screen that it is "Exporting files to disk". The Moxi Flow™ disk will be mounted to (appear as a drive on) the computer following completion of this file export process.
5. Open the Moxi Flow™ drive folder and copy the files to your computer (drag and drop or copy and paste)

Instrument Firmware and Software Upgrades

This User Guide describes OS version 1.0 of the Moxi Flow™ firmware. The firmware may be updated periodically. For information on the most up-to-date firmware, visit the ORFLO Technologies website at www.orflo.com. Register your instrument in order to receive notification about relevant firmware upgrades.

Updating Moxi Flow™ Firmware via USB

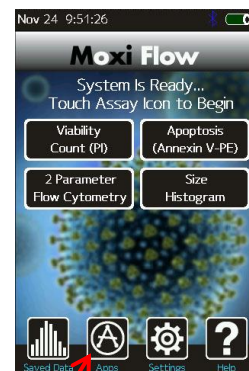
The Moxi Flow™ firmware can be updated through a USB connection. For this method of update, the user must connect the Moxi Flow™ to the computer's USB port via the provided USB cable. Unplug the power adapter to expose the USB connector for the computer. Next, the user needs to put the Moxi Flow™ into a firmware update mode. This can be done in either of the following two ways:

With the unit powered off, quickly press the power/reset button four times. When successful, the white Moxi Flow™ screen will display with text under the Moxi Flow™ logo that indicates the system is in firmware update mode. If unsuccessful, turn the power off and retry.

Moxi Flow™ Apps

Moxi Flow™ applications can be entered from touching the **Apps** icon on the home screen. Included applications in version 1.0 are:

- Clock
- Programmable timer (with sound notification)
- Restore – restores unit to factory settings
- Loader – Puts unit in Firmware/OS loader mode
- Off – powers the unit off.



Troubleshooting

Symptom	Cause	Corrective Action
Questionable concentration	Concentration of cell/bead sample is too high or too low	Make sure concentration of cell or bead sample is within recommended guidelines. Refer to General Guidelines section.
	Wrong diluent	Use a diluent that is compatible with cells being counted. ORFLO Diluent (Cat No. MXA006) or equivalent.
	Cell clumping	Ensure the cells are in a single-cell suspension. Break clumps by pipetting up and down with a standard pipette. ORFLO recommends Accutase or equivalent.
Questionable cell diameter	Wrong diluent	Use a diluent that is compatible with cells being counted. ORFLO Diluent (Cat No. MXA006) or equivalent.
	Cell clumping	Ensure the cells are in a single-cell suspension. Break clumps by pipetting up and down with a standard pipette. ORFLO recommends Accutase or equivalent.
Peak of interest indistinct	Cell/Bead concentration too low	Try running the cell sample at a higher concentration. Refer to Managing the Data section for instructions on adjusting the Y-axis.
	Cells not viable	
Instrument stops responding	Internal firmware issue due to instrument malfunction or high level of external interference	Reset instrument by pressing and holding the power button for at least 5 seconds. If problem persists, return instrument for service.
Battery will not fully charge	Battery is faulty or has surpassed its service life	Return instrument for battery replacement
Incomplete Test	Insufficient fluid (<50 µL)	Adjust pipette to ensure sufficient volume for the test. For improperly calibrated pipettes, this might require a setting >50 µL
	Cells/beads too large	Make certain that the particle type is within the specified size range of the cassettes being used
	Highly/strongly aggregated cells clogging filter and blocking flow	Try breaking apart cells using pipette trituration and/or protease treatment.

Error/Warning Messages	Cause	Corrective Action
Lost start	Sample volume too small or air bubble in test cassette	Make sure sample volume is at least 50 µL. Pipette more carefully to avoid causing bubbles.
Lost sensor - detect	Cassette not properly inserted into cell counter	Do not remove cassette from Moxi Flow™ before completion of test cycle. Ensure cassette is properly inserted.
Warning High Concentration	Concentration of cell or bead sample is too high	Make sure concentration of cell or bead sample is within recommended guidelines. Refer to General Guidelines section.
Start open Stop open Start/stop short Electrode short	Issue detected upon test cassette insertion	Reinsert the same cassette (opposite side) or a different cassette. If problem persists, return instrument for service.
Used cassette	Previously used sensor detected	Do not reuse sensors.
Low battery	Battery needs to be recharged	Use instrument with AC power or recharge instrument for a minimum of 4 hours.
Disk full	Instrument has exceeded maximum storage capacity of ~500 histograms	Delete histograms or download to computer.
Disk now full	After histogram is recorded and saved, there is no more space on the disk drive	Delete files.
Unhandled exception	Internal firmware issue due to instrument malfunction or high level of external interference	Clear error by turning instrument off and then on again. Remove cell counter from sources of external interference. If problem persists, return instrument for service.
SPI timeout	Instrument malfunction	If problem persists, return instrument for service.
Corrupt filesys	Instrument malfunction	If problem persists, return instrument for service.
Defaults loaded	Instrument has detected corruption or new version of firmware and reset all settings to factory defaults	If problem persists, return instrument for service.
False start False stop	Sensor malfunction	Use new sensor.
Incorrect x-axis scale range	Small Particle Mode selected	User touched the black "Small Particle Mode <8 µm" box to start the test. Re-run test touching the main part of the start screen.
	User rescaled test	Tests can only be rescaled immediately after the run. If it is immediately after a run, the user can cycle through the scale ranges by pressing the scale range icon (see "Managing your data" section)
	Type S cassette run on Moxi Flow Firmware 3.5 or earlier	Upgrade Moxi Flow system firmware to v3.6 or later

Maintenance and Storage

Storage

Store the Moxi Flow™ and Moxi cassettes at room temperature in a dry environment. For best results, cassettes should be used within one year of purchase.

Avoid prolonged exposure to ultraviolet light as it may degrade the touch screen display or discolor the external surfaces of the instrument.

Charging the Battery

The Moxi Flow™ contains a 3.7 V lithium ion battery which can be charged for approximately 500 cycles. The battery may be charged at any time in the discharge cycle and can be charged continuously without damage, using a PC/Mac or the power adapter. Refer to the Installation section for information on how to charge the battery.



CAUTION: To prevent battery damage, use **ONLY** an Orflo supplied power adapter or the USB port of a computer.

The battery life is about 2 to 5 years depending on use. Lithium ion batteries discharge even if they are not in use. To prevent battery damage from self-discharge, charge the battery at least once every two months.

Cleaning/Sanitizing

The Moxi Flow™ is **NOT** autoclavable. Extreme heat will damage the battery, touch screen display, and other electronic components.

The external surfaces of the Moxi Flow™ body and touch screen display can be sanitized by wiping with a soft, nonabrasive cloth moistened with 70% isopropyl alcohol (IPA) or 70% ethanol. Do not clean the instrument with any more aggressive solutions.



CAUTION: When sanitizing, make certain that no liquid enters any internal cavities of the instrument. This could result in damage the instrument.

Maintenance

There is no routine maintenance required for the Moxi Flow™. In addition, there are no user serviceable parts. Instrument repairs must be carried out by authorized personnel only.

Specifications for the Moxi Flow™

System Performance

Detection Channels:	2 (1 color, 1 size)
Laser Wavelength:	532 nm
Number of PMT's:	1
Optical Detection Range:	590/40 nm (e.g. R-PE)
Particle Size Detection:	Impedimetric (Coulter Principle)
Display:	480 x 320 color touchscreen
Resolution:	1200 histogram bins
Data Storage:	2 Gb (full histograms and scatter plot data)
Connectivity:	USB on-the-go
Data Output Format:	FCS 3.1
Pre-Programmed Tests:	Viability, Apoptosis, CD4+ T Cell, Size Histogram, PMT Histogram, MOXI-PLEX Bead Assays (multiplexed)
Open Platform?	Yes, 2-Parameter (requires R-PE reporter)
Printer Capable?	Yes (wireless Bluetooth printing)

Cassette Performance

	Type MFS	Type MFM
Preferred Sample Type:	Beads	Cell Preparations
Effective Diameter - Size Range:	3 - 15µm	4 - 20µm
Cell Volume (fL):	14 - 1800	34 - 4200
Measurement Time:	~8 seconds	~5 seconds
Concentration:	1x10 ⁴ - 2x10 ⁶ beads/mL	1x10 ⁴ - 1.75x10 ⁶ cells/mL
Sample Volume (µL):	50	50

Software

PC or Mac compatible; requires Windows XP, Windows Vista, Windows 7, or Mac OS X operating system (v 10.6 or greater)

Moxi Flow Firmware (OS)

Version 1.0

Dimensions

Length:	8.0 in. (20.3 cm)
Width:	4.5 in. (11.4 cm)
Height:	4.5 in. (11.4 cm)
Weight:	2.75 lbs (680 g)

Electrical Specifications

Internal Battery:	Rechargeable 3.7 V, 4500 mAh lithium ion
AC Power Adapters:	Input: 100-240 VAC (50/60 Hz), 0.2 A
(US and EU types)	Output: 5 VDC, 1 A

Operating Environmental Conditions

Temperature:	15-30°C
Maximum Relative Humidity:	20-80% (non-condensing)

Ordering Information

This section lists catalog numbers for the Moxi Flow Automated Cell Counter and related products. You can purchase Orflo products through a regional distributor or on-line at www.orflo.com. See the Technical Assistance section for information about contacting Orflo.

Product Description

Cat. No.

Quantity/Pack

Technical Service

For technical service, contact ORFLO Technologies at 855-TRY-MOXI (855-879-6694) or email us at info@orflo.com.

Warranty

What is Covered By Your Warranty

ORFLO Technologies ("ORFLO") warrants its products will meet their applicable specifications when used in accordance with their published instructions.* The ORFLO product warranty is a "bumper to bumper" warranty on your ORFLO automated cell analysis product for the term of the warranty. This includes all electrical parts, mechanical parts, batteries, displays, materials and workmanship. Our warranty also covers the materials and workmanship of our Cassettes and accessory products.

* Please ensure that you have the latest version of the product user guides. The most current version are found on our website at www.orflo.com

How Long is Your Warranty

Your ORFLO products are covered for a period of one (1) year from the original date of purchase from ORFLO or an approved sales distributor.* You may purchase, for an additional fee, an extended warranty for your Orflo cell analysis product for two (2) or four (4) years from the date of purchase. The extended warranty extends the duration of your warranty coverage from the date of original purchase from ORFLO or an approved sales distributor, but does not alter, change, or otherwise add to the coverage described here.

* In accordance with EU requirements, our standard product warranties remain in effect for two (2) years in EU countries.

What is Not Covered by Your Warranty

The following exclusions apply to your ORFLO warranty:

- Damage resulting from misuse, abuse, or accidents
- Damage resulting from failure to follow the proper operating instructions contained in the User Guide
- Damage resulting from failure to use an ORFLO USB cable and power adapter.

- Damage resulting from unauthorized, non-ORFLO repair or improper tampering with the product
- Damage resulting from fire, flood, or “Acts of God” beyond the control of ORFLO Technologies

What To Do If You Think You Have a Warranty Issue

Please contact ORFLO promptly at 1-855-TRY-MOXI (855-879-6694) or send an email to info@orflo.com to describe the issue you are experiencing. Please be prepared to supply your name, contact information, the serial number of your product, and the original purchase date of the unit.

If your issue remains unresolved after consulting with one of our technicians, ORFLO will provide a Returned Material Authorization (RMA) number and you will be asked to ship your product back to us at:

ORFLO Technologies
Attn: Warranty Returns (RMA#: XXXX)
130 Airport Circle
Hailey, ID 83333

An ORFLO technician will promptly examine your product to determine if the issue is covered under the ORFLO warranty. If it is, we will decide to either repair it or replace it at no cost to you, including shipping. Repair or replacement will be done as expediently as possible to ensure minimum disruption to your laboratory.

Express or Implied Warranties and Other Legal Stuff

ORFLO Technologies makes no other warranty, express or implied. There is no warranty or merchantability or fitness for a particular purpose. The warranty provided herein and the data, specifications, and descriptions of ORFLO products appearing in ORFLO’s product literature may not be altered except by expressed written agreement signed by an officer of ORFLO Technologies. Representations, oral or written, which are inconsistent with this warranty or such publications are not authorized and if given, should not be relied upon. ORFLO Technologies shall not be liable for consequential, incidental, special or other damages resulting from economic loss or property damage sustained by any customer from the use of its products.

